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DESCRIPTION OF A RHINOCYPHINE LARVA FROM SHILLONG

BY

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AGRICULTURAL RESEARCH INSTITUTE, PUSA

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PREFACE

THE discovery of the larva of *Rhinocypha* fills a decided gap in our knowledge of the Libellagine Zygoptera. So far as the Indian Fauna is concerned the Libellagine group of the Epallaginæ include the genera *Libellago*, *Micromerus*, and *Rhinocypha* and perhaps *Philoganga*, the last three of which are Oriental in their distribution, although *Rhinocypha* extends into the Australian Region as well. So far as the adult characters are concerned Munz has lately pointed out, in his "Venational Study of the Suborder Zygoptera" (*Amer. Ent. Soc., Mem.* III (1919), p. 12), that "*Rhinocypha, Libellago* and *Micromerus* form rather a compact and distinct group with M_4 arching forward and Cu_2 backward, more so than in the related genera, and with R_s and M_2 parallel at their tips and with two prominent sectors between" .....whilst Tillyard, in his "Biology of Dragonflies," page 274, distinguishes this group as :—

Wings petiolate. Numerous antenodals, but those of first and second series not corresponding beyond arculus. Arculus about halfway between base and nodus, or nearer to base (much nearer in *Philoganga*) ..	Libellagini.
Wings not petiolate. Numerous antenodals, those of first and second series nearly all corresponding. Arculus close to base, far removed from nodus	Epallagini.

Tillyard thus includes *Philoganga* in the Libellagini, although he notes that the arculus is nearer to base of wing than in the other genera. In his key to the genera of Epallaginæ, which he does not subdivide into tribes, Munz notes that the three genera *Rhinocypha*, *Libellago* and *Micromerus* are distinguishable by the area posterio

to Cu_2 having a single row of cells (occasionally two cells wide for a short distance ; but if so, Cu_2 is not arched) and the arching forward of M_4 beyond MA, whereas he places *Philoganga* and *Caliphœa* in a group characterized by the area posterior to Cu_2 having more than one row of cells beyond MA, whilst M_4 is generally not prominently arched beyond MA ; and on page 12 of his Memoir he remarks on the beginning of the tendency for R_s and M_3 to arise nearer to the subnodus in *Philoganga*. It will be seen, therefore, that the genus *Philoganga* falls rather outside of the compact group formed by the genera *Rhinocypha*, *Libellago* and *Micromerus*, and as its larva remains unknown, its exact position remains somewhat doubtful.

Turning to the larval characters, Tillyard (*loc. cit.*) defines the larva of the Epallagini (with Indian genera *Anisopleura*, *Bayadera*, *Caliphœa*, *Epallage* and *Pseudophœa*) as provided with 6-7 pairs of lateral abdominal gills and with caudal gills in the form of ovoid sacs, ending in a point, and on page 200, figure 87, he figures a larva of *Pseudophœa* to show these caudal sacci and lateral abdominal gills and states that the latter occur on either side of abdominal segments 2-8 in the larvæ of *Pseudophœa*, *Bayadera* and *Anisopleura*.

Tillyard states that the larva of the Libellagini is not known for certain but refers to a figure and description by Karsch, in *Berlin. Ent. Zeits.*, Vol. XXXVIII (1893), of a larva from Togoland which he considers to be very probably a *Libellago* ; in any case, Karsch's figure and brief description leave the exact identity doubtful. Fraser has recently described the larva of *Micromerus lineatus* in the *Records of the Indian Museum* (Vol. XVI, pp. 197–198, tab. 23 ; February 1919) and in the present paper gives a description of a larva which is almost certainly that of *Rhinocypha ignipennis*, as the adults of this species occurred in very large numbers along the stream in which it was found. As Laidlaw has remarked (*Records of the Indian Museum*, Vol. XVI, page 195 ; February 1919) the discovery of the larva of a species of *Rhinocypha*, to which that of the larva of *Micromerus* may also now be added, " is of interest as helping to strengthen the opinion that the Libellaginæ should stand as a distinct subfamily."

The larva of *Micromerus lineatus* is always found in fast running water, in which it clings to roots, submerged twigs and other debris, rarely to the stems of weeds or reeds (Fraser). All the species of *Rhinocypha* also seem to be attached to running water, but the larval habits still remain something of a mystery. Submerged weeds, sticks, stones and debris generally, besides mud from the bottom and sides of the stream, were all examined in great quantity without any tangible results except for this one larva which was found amongst submerged weed; yet the larvæ must have been present in considerable numbers and further knowledge of their habits will doubtless lead to their discovery with comparative ease. In the case of other species of *Rhinocypha*, such as *R. spuria*, which are attached to streams running over rocky beds, it is probable that the larvæ cling on to, or perhaps beneath, rocks and stones but prolonged search in such situations has so far met with no success in their discovery.

PUSA,
27*th January, 1920.*

T. BAINBRIGGE FLETCHER,
Imperial Entomologist.

DESCRIPTION OF A RHINOCYPHINE LARVA FROM SHILLONG.

BY

MAJOR F. C. FRASER, I.M.S.

(Received for publication on 28th January, 1920.)

THE single specimen under description was taken by Mr. Bainbrigge Fletcher after some weeks of patient search in the rivulets about Shillong.

Both *R. ignipennis* and *R. cuneata** are common there, the former occurring in considerable numbers, flitting along the banks of the particular stream where the present specimen was found lying up in water weed.

It is still an unsolved problem as to where the insects hide themselves. Resting places such as weeds, rocks, beneath stones in the river bed, in mud, on roots and submerged twigs, were all tried in succession without result except for the one solitary specimen now under description.

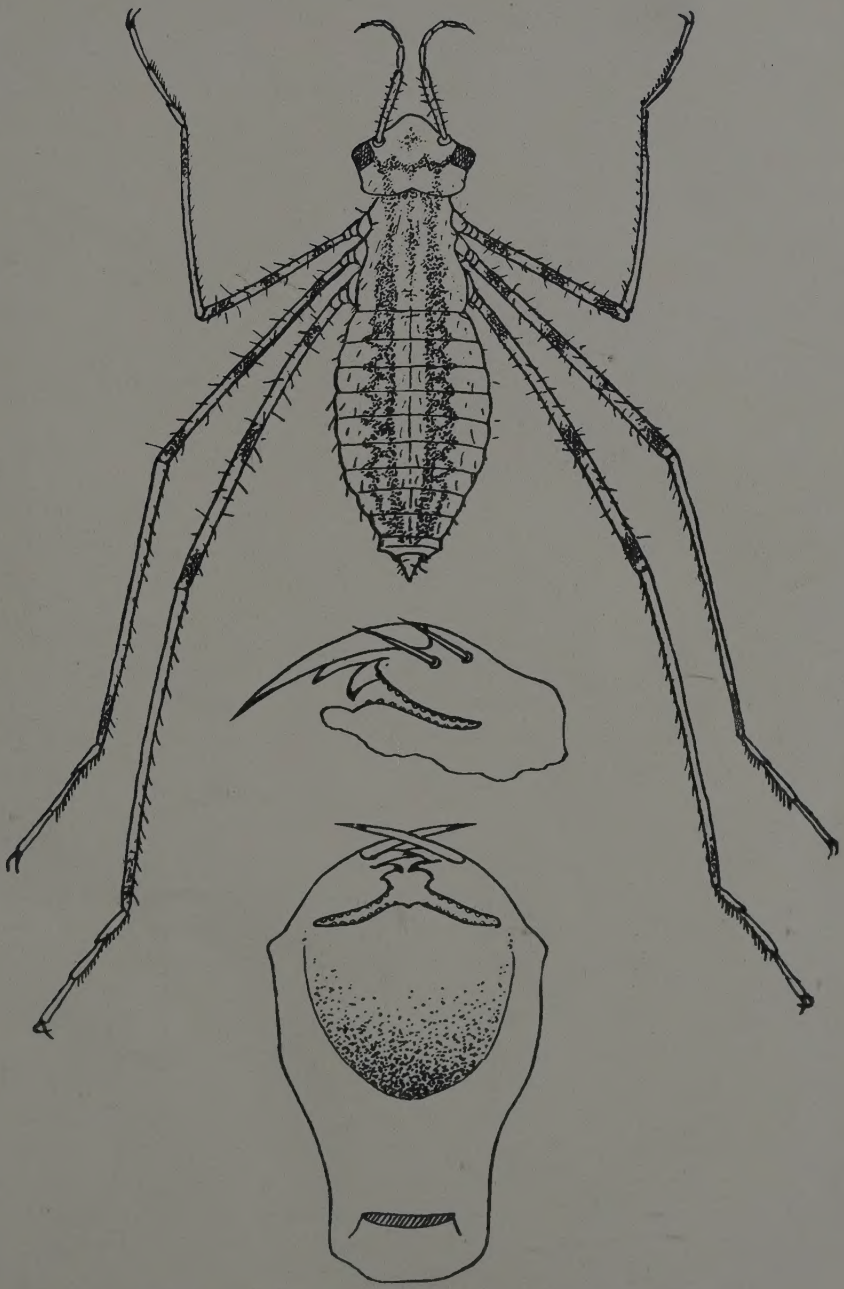
Dr. Laidlaw has published a brief note about the larva of a *Rhinocypha* in the *Indian Museum Records*, Vol. XVI, p. 195 (1919), but the larva has, with this exception, hitherto remained unknown. Mr. Fletcher's specimen is not fully developed and has not yet acquired wing cases; it is probably the larva of *R. ignipennis* as this insect was common along the banks of the stream where the larva was found, whereas *R. cuneata* was never found there.

The head is somewhat square, the eyes projecting but slightly and deeply pigmented. The antennæ are typically Calopterygine in character, the first segment being as long as all the rest taken together. The mask is flattened

*Major Fraser has identified as *R. cuneata* a *Rhinocypha* which is fairly common along rocky-bedded streams in Shillong from June to August. These specimens, however, differ markedly from examples of *R. cuneata* from Darjiling contained in the Pusa Collection and I consider them referable to *R. spuria*, Selys. It may be added that in October 1919, I took a pair of *R. quadrimaculata*, Selys, at Shillong, but neither *R. spuria* nor *R. quadrimaculata* has ever been seen along this stream (which is little better than an open ditch of water running between muddy banks in the meadow opposite the Convent) along which *R. ignipennis* occurs abundantly in September and October. There is no doubt in my mind that the larva here described is that of *R. ignipennis*.—[T.B.F.]

but the middle lobe is deeply cupped and shows but the slightest notch, not amounting to a fissure. The free borders of the lobes are minutely crenate. The lateral lobes bear a robust, moveable hook with two setæ situated at its base and two robust, short teeth internal to the moveable hook. The head, antennæ and mask very closely resemble those of *Micromerus*. The body is rounded, short and pigmented in a definite pattern ; the legs are of great length, slim and spidery and adapted for clinging to weeds or roots.

The larva has no caudal gills, nor can any site be made out where such could have been articulated. It is more probable that *Rhinocypha* larvæ do not possess these organs than that the specimen under description has lost them through autotomy. This opinion is supported in Dr. Laidlaw's note mentioned above, wherein he states apropos his own specimen, " The caudal gills are unfortunately missing." It is more probable that Dr. Laidlaw's specimen never possessed any. Both *Rhinocypha* and *Micromerus* are apparently purely proctobranchiates, the former having no caudal gills and the latter only rudimentary and non-functional ones. Neither possess lateral, abdominal gills as in the *Epallaginæ*. It is not at all probable that caudal gills may be acquired in the adult stage, as *Micromerus* possesses them in the earliest instars. As a rule, the gills of Zygopteran larvæ are relatively larger in the juvenile than in the adult stages.



LARVA AND MASK OF *RHINOCYPHA IGNIPENNIS.*

INDIAN GRASS GALL MIDGES.

BY

E. P. FELT,

State Entomologist of New York, U. S. A.

[Received for publication on 28th June, 1920.]

A SMALL collection of gall midges forwarded for study under date of 7th October, 1919, by Mr. E. Ballard, Government Entomologist, Coimbatore, has enabled us to make material additions to the food preferences of the grass inhabiting gall midges. This is really a continuation of a study which has been in progress for several years through the co-operation of Mr. Ballard and his assistant, Rao Sahib Y. Ramachandra Rao, who reared most of the species, and Mr. T. Bainbrigge Fletcher, Imperial Entomologist of the Agricultural Research Institute, Pusa, Bihar. This latest sending has resulted in the following additional data :

Dyodiplosis andropoginis, Felt, was reared from *Apludia varia*, 1-12-18, from *Andropogon pertusus*, 1-12-16 (also in July 1919, Kodeura, Kistna District), from *A. schœnanthus*, 1-12-16 and 19-8-18, all, except as noted, at Coimbatore, from *Panicum flavidum*, 19th July, Samalkota, Godavari District, and apparently the same species from *Andropogon contortus*, 19th August, 1919, Adoni, Bellary District, most of the specimens having been collected by Rao Sahib Ramachandra Rao.

Dyodiplosis indica, n. sp., was reared from *Andropogon schœnanthus* in August 1919, from material collected at Yemmiganur, Bellary District, by Y. R. Rao.

Dyodiplosis monticola, n. sp., was reared from *Andropogon monticola* in August 1919, from material collected by Y. R. Rao at Muruvani, Bellary District.

Dyodiplosis plumosa, n. sp., was reared in July 1919, from galls on *Andropogon annulatus* collected at Samalkota, Godavari District, by Y. R. Rao, and from galls on *Iseilema laxum*, 2nd July, 1919, from material collected by Y. R. Rao at Atchanta, Kistna District.

Orseoliella graminis, n. sp., was reared in July 1919, from galls in *Andropogon squarrosus*, Khus-Khus grass, collected by Y. R. Rao at Atchanta, Kistna District.

Orseoliella javanica, Kieff. & Leeuw., was reared on 10th July 1919, from galls on *Imperata arundinacea*, a synonym of *I. cylindrica*, collected by Y. R. Rao at Atchanta, Kistna District. There is little question concerning the identity of this insect with the species originally described from Java, despite the fact that the material at hand shows no such peculiar arrangement of the circumfila as depicted for the female antennal segments in the original description, and later elaborated in greater detail by Kieffer in Fascicle 152 of *Genera Insectorum*. We are inclined to believe that the artist was misled at the outset in regard to the arrangement of these peculiar structures.

Pachydiplosis oryzæ, Wood-Mason. Insects referred with little question to this species were reared in July 1919, from galls in *Ophiurus corymbosus* from material collected by Y. R. Rao at Kavitam, Kistna District.

The rearings of gall midges are summarized in the following list :—

Andropogon annulatus
- *Dyodiplosis andropoginis*, Felt.
- *Dyodiplosis plumosa*, n. sp.

Andropogon contortus.
- *Dyodiplosis ? andropoginis*, Felt.

Andropogon monticola.
- *Dyodiplosis monticola*, n. sp.

Andropogon pertusus.
- *Dyodiplosis andropoginis*, Felt.

Andropogon schœnanthus.
- *Contarinia caudata*, Felt, from ear-heads.
- *Dyodiplosis andropoginis*, Felt.
- *Dyodiplosis indica*, n. sp.

Andropogon squarrosus.
- *Orseoliella graminis*, n. sp.

Apluda varia.
- *Contarinia caudata*, Felt, from ear-heads.
- *Dyodiplosis andropoginis*, Felt.
- *Orseoliella apludæ*, Felt.

Cynodon dactylon.
- *Dyodiplosis fluvialis*, Felt.
- *Orseolia cynodontis*, Kieff. & Massal.
- *Pachydiplosis graminicola*, Kieff. & Leeuw.

Imperata arundinacea.

Orseoliella javanica, Kieff. & Leeuw.

Ischæmum ciliare, side shoots.

Dyodiplosis cornea, Felt.

Ischæmum pilosum.

Hormomyia ischæmi, Kieff.

Iseilema laxum.

Dyodiplosis plumosa, n. sp.

Ophiurus corymbosus.

? Pachydiplosis oryzæ, Wood-Mason.

Oryza sativa.

Pachydiplosis oryzæ, Wood-Mason.

Panicum flavidum.

Dyodiplosis andropoginis, Felt.

Panicum fluitans.

Dyodiplosis fluvialis, Felt.

Lasioptera fluitans, Felt.

Orseolia cynodontis, Kieff. & Mass.

Panicum nodosum.

Courteia graminis, Kieff. & Leeuw.

Panicum stagninum.

Pachydiplosis oryzæ, Wood-Mason.

Pennisetum alopecuros.

Itonida penniseti, Felt, from ear-heads.

Pennisetum cenchroides.

Itonida penniseti, Felt, from ear-heads.

Cecidomyia penniseti, Felt, from ear-heads, possibly predaceous.

Pennisetum typhoideum.

Mycodiplosis indica, Felt, from larvæ feeding on rust spores on leaves.

The Indian species of *Dyodiplosis* at least appear to display a marked preference for various grasses, some being known to occur upon several species with the probability that others have similar habits. The species are very similar in appearance, and, in order to facilitate their ready separation, the following table has been prepared.

Key to Indian species of *Dyodiplosis*.

a. The two portions of the stem of the fifth antennal segment each with a length one-half greater than the diameter.

b. The distal enlargement of the fifth antennal segment with a length twice its diameter and only slightly constricted. Mesonotum purplish brown, length 3 mm. Female, with the stem of the fifth antennal segment one-third the length of the basal enlargement, which latter has a length five times its diameter. Reared from *Panicum fluitans* and *Cynodon dactylon* .... *fluvialis*, Felt.

bb. The distal enlargement of the fifth antennal segment with a length two-and-a-half times its diameter, distinctly constricted at the basal third and almost trinodose. Length 2·5 mm. Female, fifth antennal segment with a stem one-third the length of the basal enlargement, which latter has a length four times its diameter. Reared from *Ischæmum ciliare* .... *cornea*, Felt.

aa. Basal portion of the stem of the fifth antennal segment with a length one-fourth greater than its diameter.

b. Distal portion of the stem of the fifth antennal segment with a length one-half greater than its diameter, the pulvilli of the female plumose. Reared from *Andropogon annulatus* and *Iseilema laxum* .... *plumosa,* n. sp.

bb. Distal portion of the stem of the fifth antennal segment with a length two-and-a-half times its diameter, the pulvilli in the female not plumose. Reared from *Andropogon annulatus, A.* ? *contortus, A. pertusus, A., schœnanthus, Apluda varia* and *Panicum flavidum* .... *andropogonis*, Felt.

aaa. Basal portion of the stem of the fifth antennal segment with a length equal to its diameter, the distal part with a length twice its diameter. The pupa with a distinct spine at the base of the antennæ. Reared from *Andropogon monticola* .... *monticola*, n. sp.

aaaa. Basal portion of the stem of the fifth antennal segment with a length one-half its diameter, the distal part with a length one-half greater than its diameter. The pupa with a spine and a basal tooth at the base of the antennæ. Reared from *Andropogon schœnanthus* .... *indica*, n. sp.

Most of the gall midges discussed in this paper are very similar in general appearance, differing only in minor and comparatively obscure characters ; a most striking exception is found in *Hormomyia ischæmi*, Kieff., a distinctly larger species, easily recognized by the mesonotum being greatly produced over the head, and specially by the distinctly fuscous or semifuscous wings. The small *Contarinia caudata* is very easily distinguished from the other forms noticed by the much longer ovipositor, this organ when extended being about as long as the body.

The new species are described below :—

Dyodiplosis indica, n. sp.

The species described below was forwarded under date of October 7, 1919, by Mr. E. Ballard, Government Entomologist, Coimbatore, India. The insects were labelled Yemmiganur, Bellary District, bred from galls in *Andropogon schœnanthus*, August 1919, Y. R. Rao, collector. The midge is easily distinguished from other described species of this genus by the very short basal portion of the stem in the male.

Male. Length 3 mm. Antennæ about as long as the body, thickly haired, light brown, fourteen segments, the fifth with the stems half and one-and-a-half times their diameters respectively ; the basal enlargement subglobose ; the distal enlargement subcylindrical, with a length about twice its diameter and a distinct though broad constriction near the middle. Circumfila moderately short, thick ; terminal segment, basal portion of the stem with a length about equal to its diameter ; the distal enlargement with a length a little less than twice its diameter, somewhat constricted near the middle and apically with a short, rather broadly, conical process. Palpi : first segment with a length about three times its diameter, the second a little longer than the first, somewhat broader basally, the third one-half longer than the second and more slender. Mesonotum reddish brown, the submedian lines deeply impressed. Scutellum yellowish brown. Postscutellum a little darker. Halteres pale yellowish. Abdomen sparsely short haired, mostly reddish brown. Legs mostly light straw ; claws moderately stout, rather strongly curved ; the pulvilli as long as the claws. Genitalia : basal clasp segment moderately long, broad ; terminal clasp segment short, broad ; dorsal plate rather long, broadly and triangularly emarginate, the lobes divergent and roundly tapering to obtuse lateral, sparsely setose apexes ; ventral plate moderately long, broad, broadly rounded apically, thickly and finely setose ; style short, stout, truncate apically.

Female. Length 3·75 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, dark brown, presumably fourteen segments. Mesonotum reddish brown, the submedian lines sparsely haired. Scutellum reddish yellow. Postscutellum darker. Halteres mostly pale yellowish. Abdomen sparsely short haired, reddish brown. Femora and tibiæ light straw, the tarsi reddish brown. Ovipositor short, the lobes broadly ovate and rather thickly clothed with short stout setæ.

Exuvium (*Male*). Length 6 mm. Whitish transparent, the antennal cases extending to the base of the abdomen, the wing cases to the third abdominal segment and the leg cases to the sixth abdominal segment. Antennæ

with a conspicuous basal spine and a well-developed subbasal tooth. The dorsal third of the abdominal segments with a transverse, mostly double row of stout, triangular spines.

The development of the tooth at the base of the antennal cases affords an easy means of distinguishing the exuvium of this species and *D. monticola*, Felt.

Type Cecid. A 3061, N. Y. State Museum.

Dyodiplosis monticola, n. sp.

The one specimen differs from other known species to such an extent that it is characterized as new, though a study of a series of adults may show it to be identical with one of the earlier described forms. The insect was labelled Muruvani, Bellary District, reared from gall on *Andropogon monticola*, August 1919, Y. R. Rao, collector.

Male. Length 2·5 mm. Antennæ one-fourth longer than the body, thickly haired, reddish brown, fourteen segments, the fifth with stems equal and twice the diameter respectively; basal enlargement subglobose; distal enlargement with a length two-and-a-half times its diameter, slightly constricted at the basal third, both enlargements with rather thick whorls of long, stout setæ and moderately long circumfila; terminal segment, basal portion of the stem irregular, the distal enlargement cylindric, with a length over twice its diameter and apically an obtuse conical process. Palpi: first segment subquadrate, the second half longer, more slender, the third with a length four times its diameter and tapering to a rather slender apex. Mesonotum reddish brown, submedian lines sparsely haired. Scutellum yellowish brown. Postscutellum reddish brown. Abdomen rather thickly short haired, reddish brown. Halteres mostly pale yellowish. Coxæ yellowish, legs light straw. Claws moderately long, strongly curved, simple; the pulvilli as long as the claws. Genitalia: basal clasp segment rather long, moderately slender; terminal clasp segment short, stout; dorsal plate moderately long, broad, broadly and triangularly emarginate; ventral plate long, broad, broadly and roundly emarginate apically.

Exuvium (*Male*). Length 6 mm. Whitish transparent, the antennal cases extending to the second abdominal segment, the wing cases to the fourth abdominal segment and the leg cases to the sixth and eighth abdominal segments. Antennæ with conspicuous basal horns and no subbasal tooth. Abdominal segments dorsally with a transverse row near the anterior third of moderately long, triangular spines, the rows on the basal segments becoming almost double.

Type Cecid. A 3071, N. Y. State Museum.

DYODIPLOSIS PLUMOSA, n. sp.

This peculiar species was forwarded under date of October 7, 1919, by Mr. E. Ballard, Government Entomologist, Coimbatore, India. The specimens were labelled Samalkota, Godavari District, from galls in *Andropogon annulatus*, July 1919, Y. R. Rao, collector. The species is most easily distinguished from allied forms by the peculiar feathery or plumose pulvilli in the female. This midge was also reared from galls on *Iseilema laxum*, 2nd July, 1919, collected by Y. R. Rao in the Kistna District, Atchanta.

Male. Length 2·5 mm. Antennæ as long as the body, thickly haired, light brown, fourteen segments, the fifth having stems with a length one and one-fourth and one-and-a-half times their diameters respectively; the basal enlargement subcylindrical with a length one-half greater than the diameter. Circumfila moderately long. Palpi: first segment subquadrate, the second one-half longer, fusiform, the third a little longer and more slender than the second. Mesonotum yellowish brown. Scutellum and postscutellum yellowish. Halteres mostly pale yellowish. Abdomen yellowish brown. Legs mostly pale straw. Claws missing in male. Genitalia: basal clasp segment moderately stout, with a length three times its diameter; terminal clasp segment rather short, swollen basally and nearly straight; dorsal plate moderately long, broadly and triangularly emarginate, the lobes broad, broadly round apically; ventral plate moderately long, triangularly emarginate, the lobes roundly triangular; style rather long, tapering to a narrowly rounded apex.

Female. Length 3 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, dark brown, fourteen segments, the fifth with a stem about one-third t e length of the cylindrical basal enlargement, which latter has a length three-and-a-half times its diameter, spare subbasal and subapical whorls of rather long setæ and low circumfila at the basal third and apically. Terminal segment cylindrical, with a length about three times its diameter and a short globose or fusiform apical process. Mesonotum dark reddish brown. Scutellum and postscutellum fuscous yellowish. Halteres pale yellowish. Abdomen thickly short haired, reddish brown; the ovipositor yellowish; legs mostly brownish straw; the claws long, slender, slightly curved. The pulvilli as long as the claws and apparently partly divided into a series of six or eight short, feathery appendages. Ovipositor short, the lobes narrowly triangular, with a length about twice the major width.

Exuvium. Length 2·5 mm. Mostly whitish transparent. The antennal cases extending to the base of the abdomen, and basally with a stout, triangular horn, the latter with a subbasal triangular spur. Wing cases extending to the

third abdominal segment, the leg cases to the fourth and fifth abdominal segments. The dorsum of the latter with a transverse, irregular series of short, stout spines on the anterior third.

Type Cecid. A 3062, N. Y. State Museum.

Orseoliella graminis, n. sp.

This name is bestowed upon one peculiar female reared from galls in *Andropogon squarrosus*, Khus-Khus grass, July 1919, and labelled Atchanta, Kistna District, India, Y. R. Rao, collector. The generic reference is provisional though probably correct.

Female. Length 4·5 mm. Antennæ nearly as long as the body, sparsely haired, dark brown, fourteen segments, the fifth with a stem one-third the length of the cylindrical basal enlargement slightly constricted at the basal fourth, and with a length three-and-a-half times its diameter, subbasal and subapical sparse whorls of long, stout setæ and moderately high circumfila at the basal third and apically, with a linear, sinuous filum on opposite sides. Terminal segment with a length four times its diameter and apically a spindle-shaped appendage constricted near the middle with a length half that of the enlargement. Palpi: first segment subquadrate, the second one-half longer, more slender, the third a little longer than the second, somewhat stouter, the fourth nearly twice the length of the third, more slender. Mesonotum dark reddish brown, the submedian lines and lateral margins thickly haired. Scutellum dark yellowish brown. Postscutellum yellowish brown. Halteres pale yellowish. Coxæ yellowish brown. Legs mostly dark straw. Claws slender, slightly curved, simple; the pulvilli as long as the claws. Ovipositor short, the terminal lobes tapering to a narrowly rounded, rather thickly, settose apex.

Exuvium. Length 4 mm. Whitish transparent. Antennal cases extending to the base of the abdomen, the antennal horns long, triangular, strongly chitinized and with only a very slight rudiment of the basal spine. Wing cases extending to the second abdominal segment, the leg cases to the third and fourth. The dorsum of the abdominal segments with a transverse series, several regular rows of short, stout spines, on the anterior third. Posterior extremity broadly rounded, unarmed.

Type Cecid. A 3064, N. Y. State Museum.

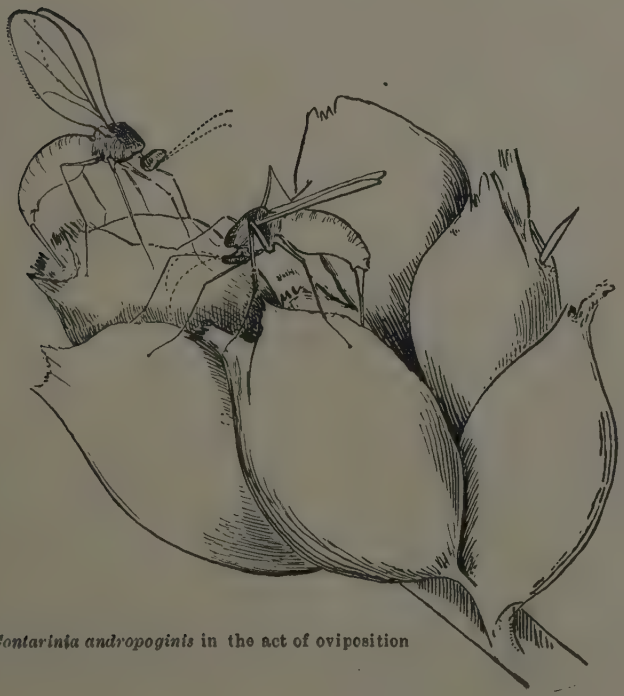
INTRODUCTORY NOTE

THE following are a few notes on the eggs and the habits of *Contarinia andropoginis*, Felt, made in July 1914. I have added them to Dr. Felt's paper together with two drawings showing Cecidomyiads in the act of oviposition and the position of a pupa in a floret, as they appeared to be not without interest. The drawings were made by me from life while oviposition was actually in progress.

Contarinia andropoginis, Felt.

Egg. The egg is about 0·45 mm. in length, and sausage-shaped and transparent except for orange pigmentation about the middle.

Oviposition. The fly runs about from floret to floret on the ear-head, continually trying with her extended ovipositor to see whether she is in



***Contarinia andropoginis* in the act of oviposition**

Pupa of *Contarinia andropoginis*.

position for egg-laying. The ovipositor is very flexible and is thrust about here and there by the fly with great ease. When the ovipositor has been successfully pushed under a glume, generally from the top, a peristaltic movement takes place and the egg is laid. So far only one egg has been found in each floret. Egg-laying from the time of the first essay with the ovipositor until the egg is actually laid takes between 10—30 seconds. Oviposition takes place either on just opened florets or on those from which the pollen sacs have not yet emerged. The egg is generally laid about half way down one of the outer glumes but has been found at the bottom and inner side.

The flies seem to be continually busy, running from flower to flower and ovipositing apparently with great frequency.

COIMBATORE:
The 10th December 1920.

E. BALLARD,
Government Entomologist, Madras.

NEW INDIAN GALL MIDGES (*ITONIDIDÆ*).

BY

E. P. FELT,

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[Received for publication on 21st December, 1920.]

THIS paper is based upon a small series of reared gall midges received, under the date of 4th May 1920, from Mr. E. Ballard, Government Entomologist in Madras. The rearings are of special interest since they increase our knowledge of the gall midges attacking *cholam* (*Andropogon Sorghum*) and *cumbu* (*Pennisetum typhoideum*) and, taken in connection with earlier records, show that each of these plant genera supports a series of gall midges, some being probably primary enemies and the others secondary or even predatory and therefore beneficial, as in the case of *Mycodiplosis indica*, Felt, which, in this latest sending, was obtained for the second time from larvæ feeding on the rust spores on *Pennisetum typhoideum*.

Camptomyia ricini, n. sp.

This species was reared from dry castor-bean stems (*Ricinus communis*). The flies were labelled "on dry castor stems or bark, Coimbatore, 6th March 1920, Ramakrishna coll." The insect is typical of the genus to which it has been referred.

Male. Length 1 mm. Antennæ about $\frac{1}{2}$ longer than the body, sparsely haired, light brown, at least 18 and probably 21 segments, the nearly transparent stems with a length $\frac{1}{2}$ greater than the cylindrical basal enlargement, which latter has a length $\frac{1}{2}$ greater than its diameter. Terminal segment is missing. Palpi: first segment subquadrate, the second with a length about three times its width, the third is a little longer than the second, much more dilated, the fourth twice the length of the third, more slender. Mesonotum reddish brown, scutellum and postscutellum pale yellowish, abdomen yellowish

brown. Genitalia slightly fuscous, halteres whitish transparent, coxæ and femora basally yellowish transparent, the legs pale straw. Claws moderately long, slender, unidentate, the pulvilli shorter than the claws. Genitalia: basal clasp segment moderately long, stout; terminal clasp segment greatly swollen basally and tapering to a somewhat produced distinctly chitinized slender tooth; dorsal plate divided, the lobes rather long, broad and broadly rounded apically; ventral plate divided, the lobes a little longer, somewhat narrow and obliquely rounded apically; harpes apparently composed of submedian chitinized, recurved hooks and surrounded by a chitinous ring, which latter bears at the posterior angles produced, broad, sparsely setose lobes.

Female. Length 1·75 mm. Antennæ extending to the base of the abdomen, sparsely haired, pale yellowish, 21 segments, the fifth with a stem about ¼ the length of the subcylindric basal enlargement, which latter has a length 2½ times its diameter; terminal segment compound, composed of two rather closely fused segments, with a total length of over three times its diameter; the distal portion subconical. Mesonotum brownish yellow. Scutellum and postscutellum yellowish; abdomen light brown; the ovipositor with a length about half that of the abdomen and recurved dorsally. Terminal lobes narrowly lanceolate and sparsely setose; other characters nearly as in the male. Type Cecid. A 3145 N. Y. State Museum.

Asphondylia pongamiæ, n. sp.

These midges produce galls on *Pongamia glabra* and are parasitized by a Chalcidid. They were labelled: 9th March 1920, Coimbatore, Ramakrishna coll. This is a typical, though somewhat peculiar, *Asphondylia*.

Gall. Globose, diameter 1·2 mm. with a thin shell and apparently a pulpy interior, presumably inhabited by several larvæ.

Exuvium. Length 4 mm. Light brown, moderately stout, the dorsum of the abdominal segments of 3 to 8 with about 5 somewhat irregular transverse rows of short, stout spines, the basal ones being more irregular and shorter and the distal one almost regular and transverse.

Pupa. Length 3·5 mm. Reddish orange, the antennal horns approximate, tapering and with a length over twice the greatest diameter.

Male. Length 4 mm. Antennæ nearly as long as the body, sparsely haired, fuscous yellowish, 14 segments, the 5th with a length about 7 times its diameter and with numerous, somewhat high obliquely and sinuously transverse fila. Terminal segment missing. Palpi: first segment short, subquadrate, the second with a length about three times its width, the third

nore than twice the length of the second, slender, tapering and with scattering, rather stout setæ. Mesonotum dark reddish brown. Scutellum and postscutellum fuscous yellowish ; abdomen yellowish brown. Genitalia yellowish ; wings hyaline ; halteres whitish transparent ; coxæ and legs a nearly uniform straw. Claws rather long, moderately stout, strongly curved, simple ; the pulvilli nearly as long as the claws. Genitalia : basal clasp segment moderately long, stout ; terminal clasp segment short, greatly swollen, bidentate apically ; the teeth unusually short and divergent ; dorsal plate divided, the lobes irregularly orbicular ; ventral plate deeply and broadly emarginate, the lobes narrowly triangular and thickly clothed distally with stout setæ.

Female. Length 4 mm. Antennæ extending to the third abdominal segment, sparsely haired, light brown, 14 segments, the 5th with a length about six times its diameter, the 12th segment with a length about 2¼ times its diameter, the 13th with a length a little greater than its diameter and the 14th globose. Palpi : first segment short, subquadrate, the second narrowly oval with a length 2½ times its width, the third more than twice the length of the second and somewhat dilated subapically. Mesonotum dark reddish brown ; scutellum and postscutellum fuscous yellowish ; abdomen dark brown ; halteres whitish transparent ; coxæ and legs light straw. Ovipositor when extended about ¾ the length of the abdomen. Type Cecid. 3147 N. Y. State Museum.

Contarinia andropoginis, n. sp.

A series of midges were reared from the ear-head of *cholam* (*Andropogon Sorghum*) and labelled : 14 VII, South India, Coimbatore. The midge approaches somewhat the American *C. sorghicola*, Coq., which lives in the seed heads of *Sorghum*, its close allies and several grasses, and from which it is easily distinguished by colorational and other characters. The species is quite distinct from the Indian *C. caudata*, Felt, reared from ear-heads of *Apluda varia* and *Andropogon schœnanthus*, and noteworthy because of the very slender body of the female and her unusually narrow wings. The male genitalia of this species are also peculiar in that the dorsal plate lobes are relatively broad, the tapering being distinctly subapical. This new species is separable from the Philippine *C. saltata*, Felt, provisionally associated with *Andropogon Sorghum*, by the distinctly different antennal structure in the male and marked differences in coloration.

Male. Length 1·4 mm. Antennæ one-half longer than the body, thickly haired, light brown, 14 segments, the 5th with stems each one-fourth longer than the diameter, both basal and distal enlargement subglobose, the circumfila

rather long and moderately numerous. Palpi : first segment subquadrate, the second twice the length of the first, moderately broad, the third one-half longer than the second, more slender, and the fourth a little longer and more slender than the third. Mesonotum dark reddish brown. Scutellum and postscutellum yellowish brown. Abdomen sparsely haired, dark yellowish brown. Halteres yellowish transparent ; coxæ and femora basally pale yellowish, the distal portion of femora a little darker ; tibiæ and tarsi a variable straw. Claws long, slender, slightly curved ; pulvilli about half the length of the claws. Genitalia : basal clasp segment moderately long, stout ; terminal clasp segment rather long, swollen basally ; dorsal plate short, deeply and triangularly emarginate ; the lobes tapering to an acute apex ; ventral lobes rather long, broadly and roundly emarginate, the lobes rather broad, broadly rounded apically.

Female. Length 1·5 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark brown, 14 subcylindrical, subsessile segments, the fifth with a length two and half times its diameter. Terminal segment with a length about two and quarter times its diameter, specially with a globose knob. Palpi : first segment subquadrate, the second a little longer, broader, the third one-half longer than the second, and the fourth a little longer than the third and more slender. Mesonotum dark purplish brown. Scutellum and postscutellum yellowish brown. Abdomen mostly dark brown, sparsely haired. Halteres pale yellowish ; coxæ and femora whitish transparent ; the legs mostly dark straw. The yellowish ovipositor fully as long as the abdomen ; the lobes slender, tapering and with a length fully three times the width. Type Cecid. A 3142 N. Y. State Museum.

Itonida seminis, n. sp.

The midges were reared from the ear-heads of *cumbu* (*Pennisetum typhoideum*). The specimens were labelled : 18-XII-16, South India, Coimbatore. The species is related to *I. penniseti*, Felt, the males of which are easily distinguished by the distinctly longer distal portion of the stem on the flagellate antennal segments, whereas in this species both parts of the stem are substantially equal.

Male. Length 1·75 mm. Antennæ as long as the body, thickly haired, light brown, 14 segments, the fifth with stems each having a length one-half greater than the diameter. Basal enlargement subglobose, the distal enlargement with a length one-fourth greater than its diameter, the circumfila moderately short. Terminal segment : basal enlargement subglobose, basal portion of the stem with a length about three times its diameter, the distal

enlargement produced, with a length about four times its diameter and tapering gradually to an irregularly rounded apex. Palpi: first segment subquadrate, with a length nearly twice its width, the second a little longer, broader, the third as long as the second, more slender, and the fourth about as long as the third, more slender. Mesonotum reddish brown; scutellum and postscutellum yellowish brown. Abdomen rather thickly haired, pale yellowish. Halteres whitish transparent, slightly fuscous, subapically. Coxæ yellowish; legs mostly dark straw; the claws moderately long, curved, slender; the pulvilli a little shorter than the claws. Genitalia: basal clasp segment short, broad; terminal clasp segment rather long, tapering; dorsal plate short, deeply and roundly emarginate; ventral plate short, broad, deeply and triangularly emarginate.

Female. Length 1·75 mm. Antennæ extending to the third abdominal segment, rather thickly haired, fuscous yellowish, 14 subsessile segments, the 5th with stems one-third the length of the subcylindrical basal portion, which latter has a length two and a half times its diameter. Terminal segment reduced, with a length little over twice its diameter, apically with a globose knob. Palpi nearly as in the male. Mesonotum brownish yellow; scutellum and postscutellum yellowish. Abdomen yellowish orange; halteres pale yellowish. Coxæ yellowish; legs mostly pale straw; the pulvilli about one-half the length of the claws. Ovipositor nearly as long as the body; the terminal lobes narrowly oval, sparsely setose. Type Cecid. A 3143 N. Y. State Museum.

Cecidomyia artocarpi, n. sp.

A number of flies were reared from rotting jak fruit (*Artocarpus*). They were labelled: "Godavari, January 1918, Ramakrishna coll.". Owing to the lack of males and the poor condition of the specimens, it is deemed best to characterize the species under the broad generic term *Cecidomyia*, leaving the reference to closely defined genus until the discovery of the opposite sex.

Female. Length 1·5 mm. Antennæ extending to the third abdominal segment, sparsely haired, light brown, 14 segments, the 5th with the stems about $\frac{3}{4}$ the length of the cylindric basal enlargement, which latter has a length about $2\frac{1}{4}$ times its diameter; terminal segment slightly produced, the basal enlargement with a length three times its diameter and apically a rather stout finger-like setose appendage $\frac{1}{3}$ the length of the enlargement. Mouth-parts distinctly prolonged, with a length about half the vertical diameter of the head. Palpi: apparently quadriarticulate, first and second segments apparently short, subquadrate, the third with a length three times its width, some-

what compressed, the fourth $\frac{1}{4}$ longer than the third, more slender. Mesonotum reddish brown. Scutellum and postscutellum yellowish. Abdomen light yellow; wings hyaline, the third vein uniting with the margin well beyond the apex of the wing. Halteres whitish apically, reddish brown basally; legs apparently a nearly uniform light straw. Claws slender, simple; the pulvilli rudimentary. Ovipositor about $\frac{1}{3}$ the length of the abdomen when extended; the terminal lobes rather long, narrow, broadly rounded apically and minutely setose. Type Cecid. A 3146 N. Y. State Museum.